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Reforestation Programs in Developing Countries

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by

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Deforestation is occurring at a rapid pace in developing countries that desperately need to conserve their forest resources. These resources comprise a major source of fuel, help protect the land from excessive soil and wind erosion, protect watersheds, and cut down on excessive nutrient losses from negligent agricultural practices.

The governments in these countries have, in the last ten years, realized the problems of deforestation and are implementing intensive reforestation programs. There programs have had varying levels of success and face numerous problems.

These countries have several common factors: reforestation is hindered by biological, economic, and socio-political considerations. Lack of mechanized tools means a reliance on manual labor. Little research has been done to indicate which species grow best under what conditions, and what pest problems are likely to occur. The people practice shifting cultivation practices. Many do not realize the value of the forests and how their agricultural practices are destroying the land.

Brazil is the fifth largest country in the world, with a population of more than 108 million in 1975, living on 851 million hectares (ha.). Dense forest makes up 347 million ha., with 240 million ha. in the Amazon basin, 12 million ha. of wooded savannas, and 34 million ha. of dry savanna with scrubby woody vegetation.

Between 1958-1973, 52 million ha. were cleared. Most of the forest is inaccessible and only a fraction of the remainder is usable. Usually logging is confined to seasonally flooded areas along the Amazon.

Brazil has one of the most intensive reforestation programs in the world. Before 1966, 600,000 ha. had been planted. Between 1966-1975, 2,352,000 ha. were planted. Plantations were established at a rate of 250,000 ha. per year. The government plans to plant 500,000 ha. per year through 1985. Conifers make up 30% of the plantations. Mostly exotic pines are planted, Pinus elliotii and Pinus taeda work well. Management practices include complete site preparation, fertilization, weed control, pruning, and periodic thinnings. The final rotation age is 20-25 years for sawlogs.

Eucalyptus plantations compose 60% of all plantings. This is basically the only broadleaved plant used, and management includes complete site preparation, fertilization and weed control. The emphasis here is for pulp, fiberboard, and charcoal wood production. Three crops are obtained over a 21-24 year period, with stump sprout regeneration.

In both plantations a large variance occurs in growth and stem quality, between and among species. Vigorous tree improvement programs are developing in industries and the universities, with work on provenance testing, plus-tree selection, grafting, seed orchard establishment and cold resistance improvement.

Government incentive programs began in the 1960's. There is little state and federal ownership of land, so the Fiscal Incentive Law of 1966 provides incentives for plantation establishment. The Brazilian Institute of Forest Development is requiring industry to plant six trees for every cubic meter of forest harvested, with 1% of all plantings in native species.

Several biological factors must be considered when planting in the tropics. Tropical soils vary a lot in texture and nutrient status making generalizations difficult, but in all soils many nutrients are leached, the level of incorporated ogranic matter is low, the soils have poor structure, not resilient under cultivation, and are easily eroded by water. Foresters need to examine agricultural practices of the area to avoid mistakes when establishing plantations. Land clearing practices used in this country have a devastating affect on the crop yields in Brazil.

A study compared yields of several crops and cropping techniques on land cleared and burned using tropical hand techniques and land cleared using a medium-sized tractor.

The soils on the tractor sites were one-twentieth as permeable and contained less organic matter. Nutrient levels were less, especially phosphorus. All crops yields were lower and returned only 20% as much yield as those cleared by hand methods. Fertilizers increased yields on both sites, but didn't alleviate the differences.

Yields of agricultural crops on unfertilized lands decreased rapidly. It's a rule of thumb that the second yield will be only one half that of the first, and the third will be even worse. It's not known yet if this loss of yield will occur with trees. If the fallow period is long enough (3-30 years) the basic slash and burn method isn't expected to harm the soil. Since 68-85% of the root system of tropical trees occupies the soil's uppermost 25-30 cm., it is critical that the soil not be disturbed.

The Phillipine Islands have similar climate in some areas to Brazil, but face different situations when attempting to reforest.

The Phillipines have less than 10% of the virgin forest remaining. After WWII logging increased and the forests were cut. About 200,000 families practice

shifting cultivation, called kaingin farming, and take about 200,000 ha. per year of forest out of production. This increases erosion, decreases soil fertility, and converts the land to unproductive grassland.

The Bureau of Forest Development has estimated that over 5 million ha. need reforesting one-quarter of that over 5 million ha. need reforesting (one-quarter of the total land area). Of this, 2 million ha. ar critical watershed areas. A lack of potable water and floods occur because of lack of forest cover.

Between 1961-1977, approximately 14,000 ha. were reforested annually. At this pace, it would have taken over 100 years to reforest the country. In 1977 this pace was increased, and in 1979 reforestation passed destruction. The forests are tropical, mixed in competition, with one dominant family, the Phillipine Mahoganies.

President Ferdinand Marcos has established several programs for citizen participation in reforestation:

1. All Filipinos 10 years and older are required to plant 12 trees per year for 5 years.
2. The Program for Forest Ecosystem Management establishes a municipal nursery in each of the more than 1,000 municipalities.
3. The Energy Farm Program plants and maintains approximately 40 ha. as community fuel reserves.
4. The Communal Tree Program assigns Kaingin farmers land to reforest in conjunction with their farming to lessen the impact.

The programs are new and range from somewhat successful to not working, for a variety of reasons. The country consists of 7,000 islands, with many different existing climatic conditions. Fast growing legumes are usually planted for soil stabilization and improvement, and watershed protection.

Many problems plague reforestation. Climatic extremes hinder establishment and early growth of seedlings. Excessive rain, flooding, and even drought occur in different areas. Nearly all areas have a hot, dry season that increases nortality among seedlings. Nursery operations must be planned and coordinated to guarantee that seedlings are hardened and ready to plant at the start of the rainy season.

Soil infertility and acidity in many areas require that most seedlings be containerized. These are grown in nurseries in cellophane bags that are removed when planted.

Forests are grown on marginal lands, since agriculture utilizes nearly all available fertile land. On poor soils, fertilizer and lime must be added to each planting hole.

On grasslands, sites must be cut and burned prior to planting and the grasses controlled after that by cutting or the use of herbicides until the trees reach 2 meters in height. Where rainfall is high, site preparation may include raised mounds or spot terraces to facilitate drainage or reduce erosion.

Many social aspects affect the reforestation programs. There is a lack of funding for labor from the government. There is also a lack of labor to do the planting. Some of the public has little regard for the seedlings, which are at times purposely destroyed. The most important problem in reforestation is the keen competition for land in an area the size of Arizona fifty million people live. The Phillipine forester spends as much time working with people as with the forests. Students at universities are now being trained in extension work as a basic part of the curriculum.

Many lands are privately owned, and the people hesitate to commit themselves to long-term management plans when their families basic food requirements are hard to meet.

In the successful programs, these problems were overcome when local people participated in all stages, from planning, implementation, to the final products of the forest. For example, the Paper Industries Corporation of the Phillipines and local land users established agra-forestry tree farms, with industry assisting with the financing of the program. Industry, university, and civic authorites also supply seeds and seedlings to villagers in some areas. Now 20,000 seedlings annually are planted this way.

India encompasses public participation more completely with several social forestry programs. India's programs have scattered plantings wherever tree-growing is possible. The objectives are to supply fuelwood to replace the use of cow dung, supply small timber, supply fodder, protect agricultural fields from wind and soil erosion, and to create recreational opportunities.

The program is divided into three areas: farm, rural, and urban forestry. In the farm program, trees are planted in association with agriculture. The main objective is to supply fuelwood for the farmer. The fuelwood could replace the estimated 458 million metric tons of wet dung that are used annually in hearths in India. At 5 metric tons per ha., this could fertilize 91 million ha. of land.

The use of trees shouldn't impair field productivity, with the proper species and sound layout of crops. There's a need to educate the people about the usefulness of trees; they think the trees will harm the crops.

The rural program is extension forestry, encompassing forest activity on community and village lands, degraded forests and marginal lands for the benefit of the people. Communal ownership of the land, with the same goals as before, meets the needs of the people. Problems occur with protection and management. The encouragement of cottage industries helps solve the problem.

Generally speaking one ha. of plantation activity generates 150-500 mandays of employment per year in rural areas during the first 3 years.

The urban program seeks to implement trees into the people's lives. Children grow seedlings in schools to later plant, which instills a respect in them for the tree.

In each country discussed, different programs are used, and different problems arise with each. Each country has severe climatic conditions to deal with, lack of mechanization, and public opposition to overcome. All evidence shows that successful reforestation programs over the long run must involve public participation.

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